

Claims

1. A method for animation of an object comprising:

2 determining a source projection matrix for projecting a source vertex array
of a source object from an original space to an ortho-normal space;

4 determining a destination projection matrix for projecting a destination
vertex array of a destination object from an original space to an ortho-normal
6 space;

determining a zero-mean source vertex array of said source vertex array;

8 determining a zero-mean destination vertex array of said destination
vertex array;

10 transforming said zero-mean source vertex array to a transformed source
vertex array using said source projection matrix;

12 transforming said zero-mean destination vertex array to a transformed
destination vertex array using said destination projection matrix;

14 computing an interim vertex array in said ortho-normal space based on a
linear interpolation of said transformed source vertex array and said transformed
16 destination vertex array;

computing an interim projection matrix based on a linear interpolation of
18 said source projection matrix and said destination projection matrix; and

transforming said interim vertex array from said ortho-normal space to
20 said original space based on said interim projection matrix.

2. The method as recited in claim 1 further comprising:

2 displaying an interim object based on said interim vertex array in said
original space at a time between display times of said source object based on
4 said source vertex array and said destination object based on said destination
vertex array, thereby, producing said animation of said object.

3. The method as recited in claim 1 further comprising:

2 determining a two-dimensional coordinates of said source object, thereby
producing said source vertex array in said original space; and
4 determining a two-dimensional coordinates of said destination object,
thereby producing said destination vertex array in said original space.

4. The method as recited in claim 4 further comprising:

2 matching each point in said source vertex array to a point in said
destination array, thus creating a link index array; and
4 matching sizes of said source and destination vertex array in accordance
with said linking index array.

5. The method as recited in claim 4 further comprising:

2 determining a range of possible linking points;
examining said range of possible linking points for determining a smallest
4 accumulative cost; and

wherein said created link index array corresponds to said smallest
6 accumulative cost.

6. The method as recited in claim 4 further comprising:
2 ortho-normalizing said source vertex array resulted from said matching
sizes of said source and destination vertex array to produce ortho-normalized
4 source vertex array; and
ortho-normalizing said destination vertex array resulted from said
6 matching sizes of said source and destination vertex array to produce ortho-
normalized destination vertex array.

7. The method as recited in claim 6 further comprising:
2 creating a mapping matrix of said ortho-normalized source vertex array to
said ortho-normalized destination vertex array in said ortho-normalized space.

8. The method as recited in claim 7 wherein said ortho-normalizing said
2 source vertex array comprises:
determining a zero-mean source vertex array;
4 determining a source transformation matrix; and
using said a zero-mean source vertex array and said source
6 transformation matrix to produce said ortho-normalized source vertex array.

9. The method as recited in claim 7 wherein said ortho-normalizing said
2 destination vertex array comprises:

determining a zero-mean destination vertex array;

4 determining a destination transformation matrix; and

using said a zero-mean destination vertex array and said destination

6 transformation matrix producing said ortho-normalized destination vertex array.

10. The method as recited in claim 8 wherein said determining said source
2 projection matrix is based on said mapping matrix and said source transformation
matrix.

11. The method as recited in claim 9 wherein said determining said
2 destination projection matrix is based on said destination transformation matrix.

12. An apparatus for animation of an object comprising:

2 means for determining a source projection matrix for projecting a source
vertex array of a source object from an original space to an ortho-normal space;

4 means for determining a destination projection matrix for projecting a
destination vertex array of a destination object from an original space to an ortho-
6 normal space;

means for determining a zero-mean source vertex array of said source
8 vertex array;

means for determining a zero-mean destination vertex array of said
 10 destination vertex array;

means for transforming said zero-mean source vertex array to a
 12 transformed source vertex array using said source projection matrix;

means for transforming said zero-mean destination vertex array to a
 14 transformed destination vertex array using said destination projection matrix;

means for computing an interim vertex array in said ortho-normal space
 16 based on a linear interpolation of said transformed source vertex array and said
 transformed destination vertex array;

means for computing an interim projection matrix based on a linear
 18 interpolation of said source projection matrix and said destination projection
 20 matrix; and

means for transforming said interim vertex array from said ortho-normal
 22 space to said original space based on said interim projection matrix.

13. The apparatus as recited in claim 12 further comprising:

2 means for displaying an interim object based on said interim vertex array
 in said original space at a time between display times of said source object
 4 based on said source vertex array and said destination object based on said
 destination vertex array, thereby, producing said animation of said object.

14. In a communication system, a method for animation of an object
 2 comprising:

transmitting from a transmitter to a receiver a source projection matrix for
 4 projecting a source vertex array of a source object from an original space to an
 ortho-normal space;

6 transmitting from said transmitter to said receiver a destination projection
 matrix for projecting a destination vertex array of a destination object from an
 8 original space to an ortho-normal space;

determining a zero-mean source vertex array of said source vertex array;

10 determining a zero-mean destination vertex array of said destination
 vertex array;

12 transforming, in said receiver, said zero-mean source vertex array to a
 transformed source vertex array using said source projection matrix;

14 transforming, in said receiver, said zero-mean destination vertex array to a
 transformed destination vertex array using said destination projection matrix;

16 computing, in said receiver, an interim vertex array in said ortho-normal
 space based on a linear interpolation of said transformed source vertex array and
 18 said transformed destination vertex array;

computing, in said receiver, an interim projection matrix based on a linear
 20 interpolation of said source projection matrix and said destination projection
 matrix; and

22 transforming, in said receiver, said interim vertex array from said ortho-
 normal space to said original space based on said interim projection matrix.

15. The method as recited in claim 14 further comprising:

2 displaying, on a display in communication with said receiver, an interim
object based on said interim vertex array in said original space at a time between
4 display times of said source object based on said source vertex array and said
destination object based on said destination vertex array, thereby, producing said
6 animation of said object.

16. In a communication system, an apparatus for animation of an object
2 comprising:

a transmitter for transmitting to a receiver a source projection matrix for
4 projecting a source vertex array of a source object from an original space to an
ortho-normal space, and transmitting a destination projection matrix for projecting
6 a destination vertex array of a destination object from an original space to an
ortho-normal space; and

8 a controller in communication with said receiver for transforming a zero-
mean source vertex array of said source vertex array to a transformed source
10 vertex array using said source projection matrix, transforming a zero-mean
destination vertex array of said destination vertex array to a transformed
12 destination vertex array using said destination projection matrix, computing an
interim vertex array in said ortho-normal space based on a linear interpolation of
14 said transformed source vertex array and said transformed destination vertex
array, computing an interim projection matrix based on a linear interpolation of
16 said source projection matrix and said destination projection matrix, transforming

said interim vertex array from said ortho-normal space to said original space
18 based on said interim projection matrix.

17. The apparatus as recited in claim 16 further comprising:

2 a display, in communication with said receiver, for displaying an interim
object based on said interim vertex array in said original space at a time between
4 display times of said source object based on said source vertex array and said
destination object based on said destination vertex array, thereby, producing said
6 animation of said object.

18. A processor for animation of an object comprising:

2 means for determining a source projection matrix for projecting a source
vertex array of a source object from an original space to an ortho-normal space,
4 and a destination projection matrix for projecting a destination vertex array of a
destination object from an original space to an ortho-normal space;

6 means for transforming a zero-mean source vertex array of said source
vertex array to a transformed source vertex array using said source projection
8 matrix, and for transforming a zero-mean destination vertex array of said
destination vertex array to a transformed destination vertex array using said
10 destination projection matrix; and

means for computing an interim vertex array in said ortho-normal space
12 based on a linear interpolation of said transformed source vertex array and said
transformed destination vertex array, computing an interim projection matrix

14 based on a linear interpolation of said source projection matrix and said
 destination projection matrix, and transforming said interim vertex array from said
 16 ortho-normal space to said original space based on said interim projection matrix.

19. The processor as recited in claim 18 further comprising:

2 means for coupling to a display for displaying an interim object based on
 said interim vertex array in said original space at a time between display times of
 4 said source object based on said source vertex array and said destination object
 based on said destination vertex array, thereby, producing said animation of said
 6 object.

20. In a communication system, a method for animation of an object in a
 2 receiver, comprising:

determining and transmitting to said receiver a source projection matrix for
 4 projecting a source vertex array of a source object from an original space to an
 ortho-normal space and a destination projection matrix for projecting a
 6 destination vertex array of a destination object from an original space to an ortho-
 normal space.

21. The method as recited in claim 20 further comprising:

2 receiving and transforming a zero-mean source vertex array of said
 source vertex array to a transformed source vertex array using said source
 4 projection matrix and transforming a zero-mean destination vertex array of said

destination vertex array to a transformed destination vertex array using said

6 destination projection matrix; and

computing an interim vertex array in said ortho-normal space based on a

8 linear interpolation of said transformed source vertex array and said transformed

destination vertex array, computing an interim projection matrix based on a linear

10 interpolation of said source projection matrix and said destination projection

matrix, and transforming said interim vertex array from said ortho-normal space

12 to said original space based on said interim projection matrix.

22. The method as recited in claim 20 further comprising:

2 displaying on a display in communication with said receiver an interim

object based on said interim vertex array in said original space at a time between

4 display times of said source object based on said source vertex array and said

destination object based on said destination vertex array, thereby, producing said

6 animation of said object.